CLAIMS

What is claimed is:

1. A system for distributing radio frequency signals in a physical area in which multiple wireless service providers wish to provide service, the system comprising:

a first plurality of wireless base stations collocated at a hub location, the base stations receiving and transmitted radio frequency signals, with at least two of such base stations operating with radio frequency signals according to two different air interfaces;

a base station interface, also located at the hub, for converting the radio frequency signals associated with the base stations to and from a transport signaling format;

a shared transport medium, for transporting the converted signals from the hub location to a plurality of remote access node locations;

a plurality of radio access nodes located at the remote access node locations, the radio access nodes each associated with a partial coverage area corresponding to only a portion of a total system coverage area, and the radio access nodes connected to the transport medium; and

the radio access nodes further each comprising:

a plurality of slice modules, with each slice module containing equipment for converting received radio frequency signals formatting according to a selected one of the air interfaces to the transport signal format and from the transport signal format to the selected one of the air interfaces.

2. A method as in claim 1 wherein the number of slice modules located in each partial system coverage area corresponding to the number of different service providers for which wireless communication service is to be provided in the respective partial system coverage area.

3. A system as in claim 1 wherein at least two of the base stations collocated at the hub are operated by wireless system service providers.

4. A system as in claim 1 wherein at least two of the base stations operate in respective different radio frequency bands.

5. A system as in claim 1 wherein at least two of the transmitted radio frequency signals are of two different bandwidths.

6. A system as in claim 1 wherein the shared transport medium is an optical fiber.

7. A system as in claim 6 wherein the shared transport medium uses a time slotted framing scheme.

8. A system as in claim 6 wherein the shared transport medium uses SONET formatting.

9. A system as in claim 8 wherein corresponding connection between a base station and a slice module is allocated a unique SONET frame.

10. A system as in claim 8 wherein the radio access nodes are arranged in a logical ring, and wherein the data frames associated with the slices in a given radio access node are dropped and added to the ring at the respective slice.

11. A system as in claim 7 wherein the time slotted frames are allocated to specific service providers.

12. A system for distributing radio frequency signals in a physical area in which multiple types of wireless communication service is to be provided, the system comprising:

a plurality of wireless base stations collocated at a hub location, the base stations receiving and transmitted radio frequency signals, with at least two of such base stations operating with radio frequency signals according to two different air interfaces as specified by at least two difference wireless service types;

a plurality of down-converter (D/C) modules, a down-converter associated with each of the collocated base stations, each down-converter converting the radio frequency signals transmitted by the respective base station to an intermediate frequency carrier signal;

a plurality of analog to digital (A/D) modules, also located at the hub, for converting the intermediate frequency signals to digital signals;

a simulcast transport formatter, for receiving digital signals from the A/D modules and converting them to a transport formatted signals;

a plurality of transport media, for carrying the transport formatted signals to remote access node locations;

a transport media distribution network, for coupling each of the transport formatted signals to a selected sub-set of the remote access node locations;

a plurality of radio access nodes located at the remote access node locations, the radio access nodes each associated with a partial coverage area corresponding to only a portion of a total system coverage area, and the radio access nodes connected to the transport medium, the remote access nodes arranged in a plurality of sub-networks; and

wherein a least one of the radio access nodes further comprises:

a plurality of slice modules, with each slice module containing equipment for converting received signals from the transport signal format to a selected one of the air interfaces.

13. A system as in claim 12 wherein

the number of slice modules located in at least one of the radio access nodes corresponds to a number of different service providers which are to provide service in the corresponding partial coverage area.

14. A system as in claim 12 wherein at least two of the base stations collocated at the hub are operated by two different wireless system service providers.

15. A system as in claim 13 wherein at least two of the slice modules in at least one of the radio access nodes contain equipment as specified by an air interface used by two different wireless system service providers.

16. A system as in claim 12 wherein at least two of the base stations operate in respective different radio frequency bands.

17. A system as in claim 12 wherein at least two of the transmitted radio frequency signals are of two different bandwidths.

18. A system as in claim 12 wherein the shared transport medium is an optical fiber.

19. A system as in claim 18 wherein the shared transport medium uses SONET formatting.

20. A system as in claim 19 wherein a corresponding transport connection between a base station and a slice module is allocated a unique SONET frame.

21. A system comprising:

a first base station generating radio frequency signals according to a first wireless system air interface;

a second base station generating radio frequency signals according to a second wireless system air interface;

a transport medium interface for converting radio frequency signals transmitted by the first and second base stations to a common transport medium format;

a shared transport medium, for transporting the converted radio frequency signals transmitted by the first and second base stations;

a plurality of remotely located radio access nodes, each radio access node associated with a predetermined portion of a total system coverage area, and each radio access node coupled to receive signals from the common transport medium, each radio access node containing at least a first and second slice module associated with the respective first and second base stations;

a first slice module containing a suite of radio transmitter, amplifier, and antenna equipment as specified by the first air interface; and

a second slice module containing a suite of radio transmitter, amplifier, and antenna equipment as specified by the second air interface.

22. A system as in claim 21 wherein at least two of the base stations operate in respective different radio frequency bands.

23. A system as in claim 21 wherein at least two of the transmitted radio frequency signals are of two different bandwidths.

24. A system as in claim 21 wherein the shared transport medium is an optical fiber.

25. A system as in claim 24 wherein the shared transport medium uses SONET formatting.

26. A system as in claim 25 wherein a corresponding transport connection between a base station and a slice module is allocated a unique SONET frame.

27. A system comprising:

a first base station operating according to a first wireless system air interfaces;

a second base station operated according to a second wireless system air interface;

a transport medium interface for converting radio frequency signals transmitted by the first and second base stations to a common transport medium;

a plurality of remotely located radio access nodes, each radio access node associated with a predetermined sub-area portion of a total system coverage area, and each radio access node coupled to receive signals from the common transport medium, each radio access node containing at least a first and second slice module associated with the respective first and second base stations; and

means for equalizing sensitivity levels of radio frequency signals radiated by the radio access nodes at levels appropriate for the respective different air interfaces.

28. A system as in claim 27 wherein the air interfaces are selected from the group consisting of AMPS, CDMA, and TDMA.

29. A system as in claim 27 wherein the means for equalizing sensitivity levels is a balanced simulcast such that radio access nodes for two different air interfaces may be collocated throughout the system coverage area.

30. A system as in claim 27 wherein the means for equalizing sensitivity levels further comprises:

means for determining which of the respective air interfaces requires a lowest intrinsic link budget level;

means for setting transmit power levels in a selected one of the radio access nodes depending upon such lowest intrinsic link budget level; and

means for simulcasting signals associated with other air interfaces for radio access nodes in adjacent sub-areas.

31. A system as in claim 27 wherein the radio access nodes further each comprise:

a plurality of slice modules, with each slice module containing equipment for converting received radio frequency signals formatting according to a selected one of the air interfaces to the transport signal format and from the transport signal format to the selected one of the air interfaces.

32. A method as in claim 27 wherein the number of slice modules located in each partial system coverage area corresponding to the number of different service providers for which wireless communication service is to be provided in the respective partial system coverage area.

33. A system as in claim 27 wherein the first and second base stations are operated by two different wireless system service providers.

34. A system as in claim 27 wherein the first and second base stations operate in respective different radio frequency bands.

35. A system as in claim 27 wherein the first and second base stations provide transmitted radio frequency signals of two different bandwidths.

36. A method for providing multiple wireless communication service providers with access to radio equipment distributed throughout a coverage area, the method comprising the steps of:

accepting requests for distribution service from the multiple service providers, the requests specifying a desired air interface for wireless communication from among a

plurality of available air interfaces, and an indication of which portions in the coverage area the particular air interface is to be supported;

installing base station equipment operating with the air interface specified by the service provider at a central location, the base station equipment being collocated with base station equipment specified by other wireless service providers;

coupling the base station equipment to receive traffic signals from a signaling network used by the wireless communication service provider;

converting the signals transmitted by the base station to a common signaling format;

coupling the common signaling format signals to a common transport medium;

locating a plurality of radio access nodes through the system coverage area, with at least one radio access node located in each portion of the system coverage area, the radio access nodes further containing radio equipment for receiving signals from the common transport medium and converting such signals to radio frequency signals; and

controlling, with a data processor, the connection of transport signals to specific radio access nodes as specified by the plurality of wireless system operators.

37. A system as in claim 36 wherein at least one of the radio access nodes further comprises:

a plurality of slice modules corresponds to a number of different service providers which are to provide service in the corresponding partial coverage area.

38. A system as in claim 36 wherein at least two of the slice modules in at least one of the radio access nodes contain equipment as specified by an air interface used by two different wireless system service providers.

39. A system as in claim 36 wherein at least two of the base stations operate in respective different radio frequency bands.

40. A system as in claim 36 wherein at least two of the transmitted radio frequency signals are of two different bandwidths.

41. A system as in claim 36 wherein the shared transport medium is an optical fiber.

42. A system as in claim 41 wherein the shared transport medium uses SONET formatting.

43. A system as in claim 42 wherein a corresponding transport connection between a base station and a slice module is allocated a unique SONET frame.